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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/583,149

06/16/2006

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CHANG223

2567

1444 7590 10/29/2008  
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EXAMINER

MOLLES, KENNETH

ART UNIT

PAPER NUMBER

4135

MAIL DATE

DELIVERY MODE

10/29/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/583,149	<b>Applicant(s)</b> CHANG ET AL.	
	<b>Examiner</b> KENNETH MOLLES	<b>Art Unit</b> 4135	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/16/06</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Drawings***

Figures 1-4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 1, 2, and 8 is objected to because of the following informalities:

In claim 1, "substrate" (line 6) should be replaced by "substrates".

In claim 1, "and" (line 6, second occurrence) should be replaced by "an".

In claim 2, "of steps" (line 5) should be replaced by "the steps of".

In claim 2, "circumstances" (line 7) should be replaced by "circumference".

In claim 8, "on" (line 2) should be replaced by "one".

Appropriate correction is required.

***Claim Rejections – 35 USC § 103***

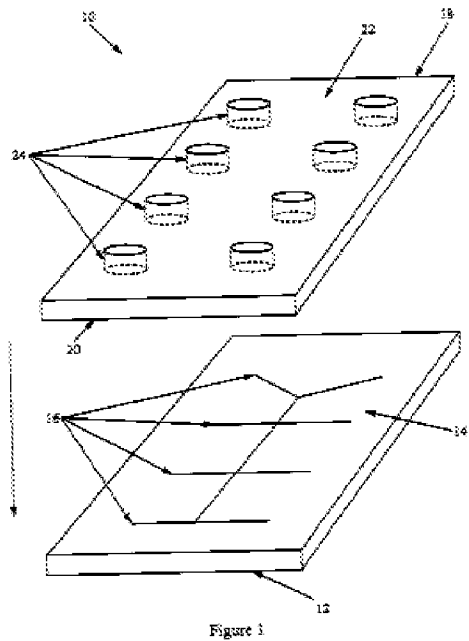
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over McReynolds, US Patent No. 6,425,972 B1 in view of Ikeda et al. US Patent No. 4,485,171.

McReynolds teaches the following limitations of claim 1 (See Fig. 1 in McReynolds):

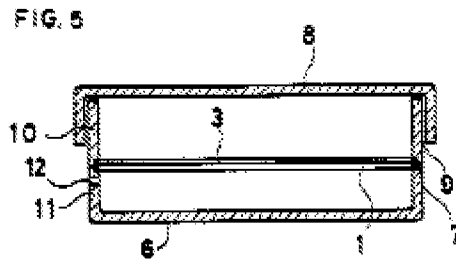
- (1) 1. (Original) A method of bonding an upper substrate (Item 18, Col. 3, Line 66-Col. 4, Line 1)**
- (2) and a lower substrate (Items 12 and 14, Col. 3, Lines 16-19)**
- (3) in order to manufacture a plastic micro chip (Item 10, Col. 3, Lines 15-16),**
- (4) comprising the upper substrate, the lower substrate and a sample filling space (Item 16, Col. 3, Lines 62-66) having a predetermined height for filling a sample between the upper and lower substrates, (Col.2, Lines 59-64).**



However, McReynolds does not teach the following limitation of claim 1:

**(5) wherein the upper and lower substrate are bonded by introducing an organic solvent between the upper and lower substrates.**

McReynolds uses vacuum to bond the upper and lower substrates (Col. 6, Lines 39-60). McReynolds teaches that the upper and lower substrates are composed of materials such as polycarbonate (McReynolds, Col. 3, Lines 41-43). Furthermore, Ikeda et al. teaches a method of forming a bond between an upper work piece and a lower work piece with mating surfaces (Ikeda et al. Fig. 5, Items 1 and 3, Col. 2, Lines 51-59) made of polycarbonate (Col. 3, Lines 13-21).



In Fig. 5 of Ikeda et al. the invention features upper and lower sections (Items 10 and 11 respectively, Col. 5, Lines 1-3) made of any of the materials listed above. Ikeda et al. further teaches the use of methylene chloride, an organic solvent, to bond the upper and lower surfaces of the work piece (Col. 5, Lines 14-17).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Ikeda et al.'s invention with McReynolds' invention would have been beneficial because the use of organic solvent to bond the upper and lower portions of the substrates would have presented fewer technical challenges than the use of vacuum as the bonding agent.

McReynolds teaches the following limitations of claim 2 as applied to claim 1 above:

**2. (Original) A method of manufacturing a plastic micro chip comprising an upper substrate, a lower substrate and a sample filling space having a predetermined height for filling a sample between the upper and lower substrates, comprising of steps:**

McReynolds teaches the following limitations of claim 2:

**(1) (a) forming a fine channel space (McReynolds, Item 16, Col.3, Lines 62-66)**

**(2) (b) overlapping the upper and lower substrates each other (Items 18, 12, Col. 4, Lines 6-12)**

McReynolds also teaches the following limitation of claim 3:

**3. (Original) The method according to claim 2, further comprising a step of forming one or more holes (Item 24, Col. 4, Lines 1-5)**

**for introducing the organic solvent communicating with the fine channel when the fine channel is formed in the step of (a). (Item 16, Col. 3, Lines 62-66)**

McReynolds can also be used for introducing organic solvent instead of Ikeda of vacuum.

McReynolds teaches claim 5:

**5. (Original). The method according to claim 2, wherein the fine channel has height of 100 $\mu$ m or less.**

McReynolds teaches a method where the device produced has dimensions on the scale of 0.1 $\mu$ m to 100 $\mu$ m (Col. 2, Lines 59-64). The fine channel of the present invention falls within the range specified by McReynolds.

McReynolds also teaches claim 6:

**6. (Original) The method according to claim 2, wherein the step of (b) further comprises a sub-step of pressurizing or decompressing the fine channel after introducing the organic solvent into fine channel.**

Since McReynolds' invention uses vacuum as the bonding agent in McReynolds Item 16, corresponding to the fine channel of the present invention, the fine channel is decompressed during bonding.

**7. (Currently Amended) The method according to claim 1, wherein the organic solvent is at least one selected from a group consisting of ketone, aromatic hydrocarbon, cyanoacrylate compound and halogenated hydrocarbon.**

**8. (Original) The method according to claim 7, wherein the organic solvent is at least on selected from a group consisting of acetone, chloroform, methylene chloride, ethlcynoacrylate and carbon tetrachloride.**

For the bonding process, Ikeda et al. describes the use of methylene chloride, which is a form of halogenated hydrocarbon according to Abdelghani et al. (abstract). Thus Ikeda et al. teaches claims 7 and 8 (Col. 5, Lines 14-17). Note that the non-patent literature of Abdelghani et al. is a supplementary reference and is not part of the 35 U.S.C. 103 prior art rejection. Also, McReynolds teaches the use of polycarbonate as material for the substrates, thus meeting the limitations of claim 9 (Col. 3, Lines 41-45):

**9. (Currently Amended) The method according to claim 1, wherein the upper and lower substrates (McReynolds Fig. 1, Items 12, 18 respectively, Col. 3, Line 62-Col. 4, Line 1) are made of polycarbonate (Col. 3, Lines 41-45), polystyrene, polyproplene, polyethylene derivatives or polymethylmethacrylate.**

McReynolds teaches the following limitations of claim 10 (See Fig. 1 in McReynolds):

**10. (Original) A plastic micro chip comprising:**

**(1) an upper substrate (Fig. 1, Item 18, Col. 3, Line 66-Col. 4, Line 1),**

**(2) a lower substrate (Item 12, Col. 3, Lines 16-19),**



**(3) a sample filling space (Item 16, Col. 3, Lines 62-66) having a predetermined height for filling a sample between the upper and lower substrates,**

**(4) and a fine channel defining a space for filling an organic solvent so as to bond the upper and lower substrates in a bonding region of a circumference of the sample filling space of the upper substrate (Col. 2, Lines 59-64).**

McReynolds in view of Ikeda et al. teaches the following limitations of claim 11:

**11. (Original) The plastic micro chip according to claim 10, further comprising one or more holes (McReynolds Fig. 1, Item 24, Col. 4, Lines 12-16) for introducing the organic solvent communicating with the fine channel (McReynolds Col. 4, Lines 16-23).**

McReynolds uses vacuum to bond the upper and lower substrates (Col. 6, Lines 39-60). McReynolds teaches that the upper and lower substrates are composed of materials such as polycarbonate (McReynolds, Col. 3, Lines 41-43). Furthermore, Ikeda et al. teaches a method of forming a bond between an upper work piece and a lower work piece with mating surfaces (Ikeda et al. Fig. 5, Items 1 and 3, Col. 2, Lines 51-59) made of polycarbonate (Col. 3, Lines 13-21).

In Fig. 5 of Ikeda et al. the invention features upper and lower sections (Items 10 and 11 respectively, Col. 5, Lines 1-3) made of polycarbonate. Ikeda et al. further teaches the use of methylene chloride, an organic solvent, to bond the upper and lower surfaces of the work piece (Col. 5, Lines 14-17).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Ikeda et al.'s invention with McReynolds'

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invention would have been beneficial because the use of organic solvent to bond the upper and lower portions of the substrates would have facilitated bonding more readily than by using vacuum.

Ikeda et al. teaches the following limitations of claims 12 and 13:

**12. (Original) The plastic micro chip according to claim 10, wherein the organic solvent is at least one selected from a group consisting of ketone, aromatic hydrocarbon, cyanocrylate compound and halogenated hydrocarbon.**

**13. (Original) The plastic micro chip according to claim 12, wherein the organic solvent is at least one selected from a group consisting of acetone, chloroform, methylene chloride, ethylcyanoacrylate and carbon tetrachloride.**

For the bonding process, Ikeda et al. describes the use of methylene chloride, which is a form of halogenated hydrocarbon according to Abdelghani et al. (abstract). Thus Ikeda et al. teaches claims 12 and 13 (Col. 5, Lines 14-17). Note that the non-patent literature of Abdelghani et al. is a supplementary reference and is not part of the 35 U.S.C. 103 prior art rejection.

McReynolds teaches claim 14:

**14. (Original) The Plastic micro chip according to claim 10, wherein the fine channel has a height of 100µm or less.**

McReynolds teaches a method where the device produced has dimensions on the scale of 0.1µm to 100µm (Col. 2, Lines 59-64). The fine channel of the present invention falls within the range specified by McReynolds.

Claim 15 states that:

**15. The plastic microchip according to claim 10, wherein the bonding region is transparent.**

McReynolds does not teach a bonding region that is transparent, but Ikeda et al. teaches the use of a transparent vessel (Ikeda et al. Fig. 5, Item 6, Col. 5, Lines 17-20), which includes the bonding region (Ikeda et al., Items 10 and 11, Col. 4, Lines 54-60). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Ikeda et al.'s invention with McReynolds' invention would have been beneficial because the transparency would facilitate the application of the organic solvent.

McReynolds teaches claim 16:

**16. (Original) The plastic micro chip according to claim 10, wherein the upper and lower substrates are made of polycarbonate, polystyrene, polypropylene, polyethylene derivatives, polymethylmethacrylate or acryl-based plastic material.**

McReynolds teaches the use of polycarbonate as material for the substrates, thus meeting the limitations of claim 16 (Col. 3, Lines 41-45).

Ikeda et al. teaches the following limitations of claims 17 and 18:

**17. (New) The method according to claim 2, wherein the organic solvent is at least one selected from a group consisting of ketone, aromatic hydrocarbon, cyanoacrylate compound and halogenated hydrocarbon.**

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**18. (New) The method according to claim 17, wherein the organic solvent is at least from a group consisting of acetone, chloroform, methylene chloride, ethylcyanoacrylate and carbon tetrachloride.**

For the bonding process, Ikeda et al. describes the use of methylene chloride, which is a form of halogenated hydrocarbon according to Abdelghani et al. (abstract). Thus Ikeda et al. teaches claims 12 and 13 (Col. 5, Lines 14-17). Note that the non-patent literature of Abdelghani et al. is a supplementary reference and is not part of the 35 U.S.C. 103 prior art rejection.

McReynolds teaches claim 19:

**19. (New) The method according to claim 2, wherein the upper and lower substrates are made of polycarbonate, polystyrene, polypropylene, polyethylene derivatives or polymethylmethacrylate.**

McReynolds teaches the use of polycarbonate as material for the substrates, thus meeting the limitations of claim 19 (Col. 3, Lines 41-45).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over McReynolds, US Patent No. 6,425,972 B1 in view of Ikeda et al. US Patent No. 4,485,171 and in further view of Kilichowski et al. US Patent No. 4,357,369.

**4. (Original) The method according to claim 2, further comprising a step of performing a corona or plasma treatment for the bonding area so that the organic solvent**

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**subsequently introduced smoothly flows and a bonding strength is increased, after forming the fine channel.**

McReynolds and Ikeda et al. teach a method for bonding substrates but do not teach using a plasma or corona. Kilichowski et al. does teach this. Kilichowski et al. describes the use of plasma etching on polystyrene substrates (Col. 1, Lines 34-52). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Kilichowski et al.'s invention and Ikeda et al.'s invention with McReynolds' invention would have been beneficial because the organic solvent would flow more easily over a smoother surface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH MOLLES whose telephone number is (571)270-7402. The examiner can normally be reached on Monday - Friday 8:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William M. Brewster can be reached on (571)272-1854. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

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like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KENNETH MOLLES/  
Examiner, Art Unit 4135  
20 October 2008

KM

/William M. Brewster/  
Supervisory Patent Examiner, Art Unit 4135